Recommended Soldering Techniques for ATC 500 Series Capacitors
1.0. SCOPE. The following procedures have been successful in soldering ATC500 series capacitors to both soft and hard substrates with a variety of metallizations. For general handling and soldering recommendations as well as suggestions regarding epoxy bonding, kindly refer to Bulletin Nos. 201 and 202, included in our catalogue. The specific techniques and materials described herein have resulted in good solderability and die shear performance, but this is not to say that other procedures and materials may not be equally successful. It should be noted that the fluxes used may not necessarily be compatible with other board mounted components or processes and therefore appropriate caution in this regard is strongly advised.

2.0. SOLDERS AND FLUXES. The table below presents various solder-flux combinations that have yielded good results on substrates such as G10, Rogers Duroid, alumina, and beryllia, with metallizations that included gold, bare copper, and copper flashed with nickel/gold. The designation “Ind” refers to an “Indalloy” product of the Indium Corporation of America. “Integral flux” refers to flux incorporated directly into solder paste or as a core of wire solders. “WC” refers to water-clean flux, “NC” to no-clean flux. Solders designated only by a number had the compositions given in the following key: 1 = 50% In, 50% Pb; 2 = 60% Pb, 40% In; 3 = 60% Sn, 40% Pb; 4 = 63% Sn, 37% Pb; 5 = 96.5% Sn, 3.5% Ag.

![Table 1. Suggested Solder–Flux Combinations](image)
3.0. EQUIPMENT/SUPPLIES.
1. Hot plate with temperature control.
2. Surface thermometer.
3. Air circulating oven set at +90 ± 5 °C (for solder paste high volume production).
4. IR or Air/Nitrogen furnace (for high volume production). Refer to Bulletins 201 and 202 for recommended profiles.
5. Soldering iron – pencil type with temperature control and multiple tip size options.
6. Fiberglass brush or “pencil eraser” type circuit board trace cleaner – to remove oxides from copper metallization.
7. Tweezers: One with fine metal tips #1 or #7 and one plastic or Teflon type with fine tips.
8. Vacuum pickup with a small rubber or a non-metallic tip.
9. Cotton swabs or other suitable cleaning swabs.
10. Wooden or high temp plastic probe stick.
11. Suitable solvent for flux used.
12. Microscope with at least 10X power, zoom preferred for inspection.
13. Paste dispensing machine with suitable tips for solder paste.
15. Knife, X-acto type #11 blade.
17. Finger cots or gloves.
18. ATC500 series caps.

In all the following procedures, the soldering iron must be properly tinned with the solder that is going to be used. Failure to do so will lead to cross contamination of solders and possible solder joint failure.

Refer to equipment/supply list when appropriate in procedure, as well as solder chart for the applicable metallization/plating.

4.0. PROCEDURE FOR SOLDERING TO PC BOARDS/SUBSTRATES THAT ARE NOT MOUNTED INTO A HOUSING OR DO NOT CONTAIN A METAL CORE.

Steps 1 - 4 are the same as for Procedure 4.0 above.

5. Place assembly on a preheated hot plate set to +125 °C. (This is a safe temperature for most assemblies.) Leave standing until the top surface gets to about the temperature of the hot plate.

The remaining steps generally follow steps 5 – 16 of Procedure 4.0, except that the hot plate is always used to raise the temperature of the whole assembly before the soldering iron is applied.

6.0. PROCEDURE FOR SOLDERING TO CERAMIC SUBSTRATES.

Steps 1 – 4 are the same as for Procedure 4.0 above.

5. Place ceramic substrate in a preheated oven set at +90 °C for approx. 5 minutes.

Remove from oven; the remaining steps generally follow steps 5 – 16 of Procedure 5.0 above.

7.0. INSPECTION. Inspection criteria for devices with metallized terminations on the bottom side only are given in ANSI/J-STD-001A (Rev. A, 1/95), section 9.2.6.7.
FIGURE 1. Proper trace reflow and solder amount needed for attachment

FIGURE 2. Showing proper capacitor tinning inspection
RECOMMENDED SOLDERING TECHNIQUES FOR ATC 500 SERIES CAPACITORS

Cotton swab or heat resistant probe
Soldering iron is touching the capacitor.
NO GOOD
Soldering iron
Soldering iron is touching the trace, NOT the capacitor
Board or ceramic substrate

Figure 3. Showing proper soldering iron location

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